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ON STATISTICS, MATHEMATICS,
TEACHING, AND RESEARCH

ICSMTR 2015

*Increasing Statistical and Mathematical Literacy through
High Quality Teaching and Research*

October 9-10, 2015

Makassar, South Sulawesi, Indonesia

STATISTICS DEPARTMENT AND MATHEMATICS DEPARTMENT
STATE UNIVERSITY OF MAKASSAR
INDONESIA

CONFERENCE PROCEEDING

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**Statistics Department and Mathematics
Department
Faculty of Mathematics and Natural Sciences
State University of Makassar
Indonesia**

**ICSMTR 2015: INCREASING STATISTICAL AND MATHEMATICAL
LITERACY THROUGH HIGH QUALITY TEACHING
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WELCOME SPEECH

Forewords from the Head of Committee

Bismillahirrahmanirrahim

Assalamu'alaikum Warahmatullahi Wabarakatuh

First, I want to give our welcome to all the delegates, speakers, and participants coming today. Welcome to the State University of Makassar, UNM.

This International Conference on Statistics, Mathematics, Teaching, and Research (ICSMTR) 2015 is primarily organized by Statistics Department and Mathematics Department, Faculty of Mathematics and Sciences, State University of Makassar. It is conducted in two days from 9th to 10th October 2015. It involves one keynote speaker, Governor of South Sulawesi, eight invited speakers, and approximately 80 parallel speakers. Besides, this conference also invites delegates from twelve LPTKs (Institute of Teacher Education) to conduct a scientific meeting reviewing KKNi for Mathematics Education curriculum in higher education.

Ladies and gentlemen, as I previously said, the conference proudly invites eight invited speakers coming from several countries. Therefore, on behalf of the committee members, I would like to express my sincere thanks to the invited speakers, specifically:

1. Professor Kerrie Mengersen (Queensland University of Technology, Australia)
2. Professor Shigehiko Kanaya (Nara Institute of Science and Technology, Japan)
3. Professor Ahmad A. Bahnassy (Faculty of Medicine, King Fahd Medical City, Saudi Arabia)
4. Professor I Gusti Ngurah Agung (State University of Makassar, Indonesia)
5. Professor Hamzah Upu (State University of Makassar, Indonesia)
6. Professor Muhammad Arif Tiro (State University of Makassar, Indonesia)
7. Professor Mohd. Salmi Md Noorani (Universiti Kebangsaan Malaysia, Malaysia)
8. Dr. Darfiana Nur (Flinders University, Australia)

Next, it is my privilege to thank all organizing committee members for their contributions to the success of this event. I would like also to apologize for all of you if there are some inconvenience during this conference.

Finally, I would like to thank to the speakers and participants. I wish you all have two fruitful days in Makassar.

Thank you very much for the attention.

Wassalamu'alaikum Warahmatullahi Wabarakatuh

Suwardi Annas, Ph.D.

Head of Committee



**Forewords from the Dean of Mathematics and Sciences Faculty,
State University of Makassar**

Bismillahirrahmanirrahim

Assalamu'alaikum Warahmatullahi Wabarakatuh

Alhamdulillah, all praises be to the Almighty God, Allah *subhanahu wata'ala*.

I would like to say that I welcome and highly appreciate any attempts of both the Statistics Department and Mathematics Department to organize this International Conference on Statistics, Mathematics, Teaching, and Research in the State University of Makassar. I do hope that this conference would be a great chance for you as researchers or scholars in enhancing your research quality within a framework of evolving sciences. May Allah *subhanahu wata'ala* opens our mind, widens our view, strengthens our soul, and blesses our conference that it will be useful as we are hoping.

At last, as the Dean of the Faculty of Mathematics and Natural Sciences, State University of Makassar (FMIPA UNM), I am sure that there are some weaknesses and mistakes in performing this conference. I therefore do apologize to you and may Allah *subhanahu wata'ala* forgive all of us.

Wassalamu'alaikum Warahmatullahi Wabarakatuh

Professor Abdul Rahman

Dean of Faculty of Mathematics and Sciences

State University of Makassar



Forewords from Rector of UNM

*Bismillahirrahmanirrahim
Assalamu'alaikum Warahmatullahi Wabarakatuh*

Your respectable, the high officials of State University of Makassar, the committee, the speakers, and the participants of conference.

It gives me great pleasure to extend to you all a very warm welcome, especially to our keynote speakers who have accepted our invitation to convene the conference. ICSMTR is one of our educational activities that covers a wide range of very interesting items relating to statistics, mathematics, teaching and research.

By taking participation of this conference, it is highly expected to all of us to share our research findings to society and continuously develop new ideas and knowledge. Those things are two significant steps in improving the quality of nations around the world, increasing our familiarity to each other, and even avoiding underdevelopment.

Furthermore, I would like to take this opportunity to express my heartfelt gratitude to all organizing committee especially for Statistics Department and Mathematics Department of Faculty Mathematics and Natural Sciences that primarily hosts this conference.

Finally, this is a great time for me to declare the official opening of the International Conference on Statistics, Mathematics, Teaching, and Research (ICSMTR) 2015.

I wish you a very enjoyable stay in Makassar
I warmly welcome you again, as in Makassar, we say "*salamakki battu ri mangkasara*"

Wassalamu'alaikum Warahmatullahi Wabarakatuh.

Prof. Dr. H. Arismunandar, M.Pd.

Rector of State University of Makassar



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ASSOCIATION BETWEEN THE PERCEPTION ON STATISTICS AND STATISTICAL THINKING ABILITY OF THE STUDENTS IN INTEGRATED SOCIAL SCIENCE EDUCATION OF SOCIAL FACULTY IN STATE UNIVERSITY OF MAKASSAR

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ABSTRACT

Some of the students on Social Science Department revealed that they less enjoyed the statistics and less integrated when given the task by statistics lecturer. One of aspects which assessed in statistics is statistical thinking ability. The statistical thinking ability is the ability to understand and comprehend the whole of statistical process. This study aims is to describe perception in statistics based on statistical thinking ability of the students in integrated social science education of social faculty in state university of Makassar. The study is a descriptive research with quantitative method. The subjects of the study were six students in Integrated Social Science Education Department consisted of two high ability students, two medium ability students, and two low ability students. The data were collected by conducting technique or method triangulation used to collect the data from the same source with different techniques, namely written tests on forms of questionnaire and test. The result of the study reveals that the result of Chi-Square test obtained $\chi^2_{hitung} = 8.630$ and $p_{value} = 0,013$ where $p_{value} < 0,05$, meaning that there is significant correlation or association between statistical thinking ability and the perception on statistics. Almost all of high ability student have positif perception, more of half of medium ability students have negative perception, and almost all of low ability students have negative perception

Keywords: perception of statistics, statistical thinking.



1. INTRODUCTION

Based on the initial interview conducted on several student Social Sciences, most of them mentioned that they are less and less attention to the statistical enjoys when given the task of a lecturer in statistics. It is an impact on their ability to complete the final project or thesis because of their lack of knowledge in terms of determining the statistical process proposed in their research methods. One aspect that is assessed in statistical science is the ability to think statistically or Statistical Thinking Ability.

Statistical thinking skills is the ability to understand and grasp the overall statistical processes, and apply an understanding of the real problems with the critique, evaluate, and make generalize relates to describe the data. On the basis of these considerations and because of the many factors that affect the ability to think statistically (Statistical Thinking), as well as to improve the accuracy of the results, so in this study will be assessed variables that theoretically allegedly associated with the ability mastery of statistics students FIS UNM especially the ability to think statistically (Statistical Thinking), variable perceptions of statistics.

This study aimed to determine the association between the perceptions of statistics with statistical thinking skills (Statistical Thinking) on the education of students majoring in Integrated Social Sciences Faculty of Social Sciences UNM; and to describe the factors that influence the perception of statistics on student majoring in Social Science Education Faculty of Social Sciences UNM.

2. GENERATION OF THE DATA

2.1. Perception about statistics

Understanding the perception according Slameto (2010: 102) is "a process that involves the inclusion of information in the human brain". Humans will be in constant contact with the environment through perception. Rachmat (1992: 251) explains that "perception is the experience of objects, events, or relationships obtained by concluding information and interpret the message".

Further Walgito (2002: 87) explains that "perception is a process that is preceded by the sensing process, ie the process of receipt of the stimulus by the individual through the sensory organs or also called sensory processes". Another opinion expressed by Learner (Mulyono, 2003: 151) defines a "perception is the limit used in the process of understanding



and interpreting sensory information or intellectual ability to plan the meaning of the data received from the various senses".

Perceptions of students raises a very important factor in influencing attitudes, achievement, education and career choice compared to other variables such as anxiety, Math experience, and confidence (Maria and George, 2002). Perception is a view of a personal nature. Perceptions can emerge with the aid of the senses, either through auditory, visionaries, feeler, and the other senses. Perceptions also arise because of the encouragement of knowledge reinforced by experience and observation that a person does.

2.2. Statistical thinking

Laurie et al (2002: 17) revealed that "students who lack mastery on the basic facts will continue to experience failure as subsequent math instruction is provided." Students who do not master the basic concepts of mathematics since the basic level will remain at the same level even though it should already be at a high level.

Similarly said Haddens (Battle 2007: 12) that "learning and mastering the basic skills of mathematics Allows for student achievement in the subject". Previous Ron Snee (1986: 27) says "..., statistical thinking is used to describe the thought processes that acknowledge the ubiquitous nature of variation and that its identification, characterization, qualification, control, and reduction provide a unique opportunity for improvement ...". Statistical thinking is used to describe the thought process that recognizes the nature of that variation everywhere, identification, characterization, qualification, control, and reduction to provide a unique opportunity in a repair.

Furthermore Snee (1990: 118) defines think statistically as the thought process that tests that variation is all around us and is present in everything that we do, all the work of a series of processes that are interconnected, and identify, karakteristikisasi, measurement, control, and reduce variation provides an opportunity for improvement.

Shaughnessy et al. (1997) states that statistical thinking process (statistical thinking) there are four, abbreviated DORA, namely: 1) describing Data Displays; 2) Organizing and Reducing Data; 3) Representing Data; and 4) Analyzing and Interpreting Data. Furthermore, any statistical thinking process (statistical thinking) consists of four levels, abbreviated ITQA namely: 1) idiosyncratic; 2) Transitional; 3) Quantitative; 4) Analytical.



2.3. Affecting factors of perception

According Widayani (2011) so that the individual can be realized, can be held perception, it is affected by several factors:

1. The existence of the object perceived

The object of the stimulus that the sensory organs or receptors. The stimulus may come from outside directly on the sensory organs.

2. Tool sensory or receptor

It is a tool to receive a stimulus and as a tool to organize responses require motor nerve.

3. Attention

To realize or to conduct perception of something is necessary also for attention is the first step as a preparation for the holding of perception. Attention occurs when we concentrate on one of the tools of our senses, and the exclusion of inputs through other sensory organs (Rachmat, 1986).

The same context expressed Xinrong Yang (2013) that there is consistency and a significant relationship between students' perception of their learning environment with their mathematics achievement. The relationship identified from the results of the students and their perception of affective about mathematics learning environment, especially in terms to motivate students.

Based on the study of theory and framework set forth above, then the hypothesis is formulated as follows: "There is an association between the perceptions of statistics with statistical thinking skills (Statistical Thinking) on the education of students majoring in Integrated Social Sciences Faculty of Social Sciences UNM".

3. METHOD

This research is a descriptive study. Subjects in this study were students majoring in Integrated Social Education FIS force UNM 2013. The subject of this research as much as 6 people consisting of 2 high-ability students, 2 students capable of being, and 2 low-ability students.



Perceptions of statistics are a response (acceptance) directly from something the person knows some things through the senses. This variable is measured on student opinion obtained from a questionnaire containing their responses on: 1) understanding of the object of statistics, 2) the benefits and usefulness of statistics, 3) attention to statistics. Indicators of perception on statistics are presented in the table below.

Table 1: Indicators of perception on statistics

Variable	Dimension/Aspects	Indicators
Perceptions of students about statistics lecture	1. Selection 2. Organization 3. Interpretation	1. Feedback on the definition of the object of statistics 2. Feedback on the benefits and usefulness of statistics 3. Attention to the course statistics

Statistical Thinking is the ability to understand and grasp the overall statistical process. This variable is measured by a test given to students which contain indicators on: understanding the concept or the scope of the data, classify the data, presenting data, calculating data, and analysing and interpret data. The indicators used to measure the ability to think statistically (Statistical Thinking) is a student able to:

1. Understanding the concept or the scope of the data.
2. Grouping the data.
3. Presenting data
4. Calculate data.
5. Analyze and interpret data.

The instruments used are 1) test the ability to think statistically in the form of a written multiple choice test on the material introduction of social statistics; 2) Questionnaire perception of statistics in the form of a closed questionnaire, the questionnaire on each item becomes available alternatives so that the respondents' answers can easily select one answer from the answer alternatives are available.

Further analysis is Chi-square analysis to find associative or statistical relationship between the thinking skills of students who categorized high, medium, low, with students' perceptions about the statistical category of high, medium low.



The chi-square formula is as follows:

$$\chi^2 = \sum_{i=1}^2 \sum_{j=1}^3 \frac{(P_{ij} - H_{ij})^2}{H_{ij}}$$

where,

χ^2 : Chi-Kuadrat value

P_{ij} : Frequency of observation in row-i column-j

H_{ij} : Frequency of probability in row-i column-j

4. RESULT AND DISCUSSION

Furthermore, the data presented the results of research and discussion about the perception of a statistical description in terms of the level of Statistical Thinking on the education of students majoring in Integrated Social Sciences Faculty of Social Sciences UNM. In this study, the research subjects are determined based on statistical thinking skills of students through a written test or TKBS. Furthermore, researcher analyzed scores of each student's ability to think statistically and breaks it into three categories: high, medium, and low. Then the students should also be given a questionnaire with the aim to measure the perceptions of students' perceptions about the statistics. Of student scores obtained from the questionnaire perception of statistics analyzed and grouped into two categories, namely the positive and negative perceptions.

The criteria for grouping Statistical Thinking are presented in the table below.

Table 2: Categories of statistical thinking

Score of ability	Categories
57 - 100	High
34 - 56	Medium
0 - 33	Low

The categories of grouping Perceptions of Statistics are shown in the table below.

Table 3: Categories of grouping Perceptions of Statistics

Perception Score	Categories
100 - 125	Positive



25 - 99	Negative
---------	----------

In this study, researcher used Chi-square to know about association between statistical thinking variable and perception of statistics variable. Below is data frequency which has shown in Crosstab table form.

Table 4: Cross tabulation between Statistical Thinking and Perception of Statistics

Variable		Statistical Thinking			Total
		High	Medium	Low	
Perception	Positive	7	10	1	18
	Negative	2	25	5	32
Total		9	35	6	50

From the table above it can be seen crosstab that is based on the ability to think statistically (Statistical Thinking) students obtained 78% have a positive perception and 22% have a negative perception in the group of high KBS. Later in the KBS group were, 29% have a positive perception and 71% have a negative perception; and at lower KBS group, 17% had a positive perception and 83% have a negative perception.

Vice versa from the above table can also be shown the ability to think statistically (Statistical Thinking) students based on their perception of statistics. On the positive perception of the group acquired 39% have a high KBS, 55% had moderate KBS, and 6% had low KBS. Then the group acquired a 6% negative perceptions have a high KBS, KBS 78% have moderate and 16% had low KBS.

From the analysis of the data Chi-Square statistical thinking skills (Statistical Thinking) and the perception of statistics, the obtained Chi-Square test results are shown in Table below.

Table 5: Result of Chi-Square Analysis

	Value	Df	<i>p</i>
Pearson Chi-Square	8,630 ^a	2	,013
Likelihood Ratio	8,522	2	,014
Linear-by-Linear Association	6,947	1	,008



	Value	Df	<i>p</i>
Pearson Chi-Square	8,630 ^a	2	,013
Likelihood Ratio	8,522	2	,014
Linear-by-Linear Association	6,947	1	,008
N of Valid Cases	50		

The table above shows the results of analysis using Chi-Square which would then be used to test hypotheses of the study. From the above test results obtained $\chi^2_{count} = 8,630$ and $P_{value} = 0,013$. Because $P_{value} < \alpha = 0,05$ and then H_0 rejected or H_1 accepted, which means that there is a significant relationship between Statistical Thinking with the perception of statistics.

It obtained above in line with the opinion of Ajzen and Fishbein (Gerunda, 2009) which states that the perception affects the amount of their efforts to achieve their academic achievement. Likewise with the opinion of Maria and George (2002) which states that students' perception raises a very important factor in influencing attitudes, achievement, education and career choice compared to other variables such as anxiety, Math experience, and confidence.

Furthermore, from the results of the interview obtained data about students' perceptions about the statistics based on the level or category of statistical thinking skills (Statistical Thinking) has. From the results of the interview subjects also obtained feedback on the factors that influence their perception of statistics.

Students have the Statistical Thinking is to have an understanding of the sense objects but the statistics are still lacking understanding of the benefits or usefulness of good statistics. Attention to the subject of statistics is also quite good. That is the perception of the student well enough.

Students Statistical Thinking low have still less understanding about the definition of statistical objects, understanding of the benefits or usefulness of statistics were quite good. But attention to the subject of statistics is still lacking. That is the perception of the majority of students are still lacking.

This was revealed by Widayani (2011) that individuals who hold the perception influenced by the existence of the object perceived and attention. There is also the factors that influence



the perception according ness (1989) is self-concerned and the factors of the situation. Reinforced also by Wibowo (1997) that the psychological state of being calm will always rational thinking, rational mind would produce a true perception.

5. CONCLUSION

Based on the results of Chi-Square test, it was concluded that there is an association between Perceptions of statistics with Statistical Thinking on the education of students majoring in Integrated Social Sciences Faculty of Social Sciences, State University of Makassar.

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